For Seattle Science Center

BROWN PROCESS CAMERA
Models 2000, 3000, and 4000

INSTRUCTION AND PARTS MANUAL

PHONE NUMBERS Brown Manufacturing Company
Sales - (312) 869-8800
Service - (815) 338-1070 • Shipping - (815) 338-4500

BROWN/APĒCO®
BROWN MANUFACTURING, A DIVISION OF APĒCO CORPORATION
2000 DEMPSTER STREET • EVANSTON, ILLINOIS 60204 • PHONE 312/869-8800

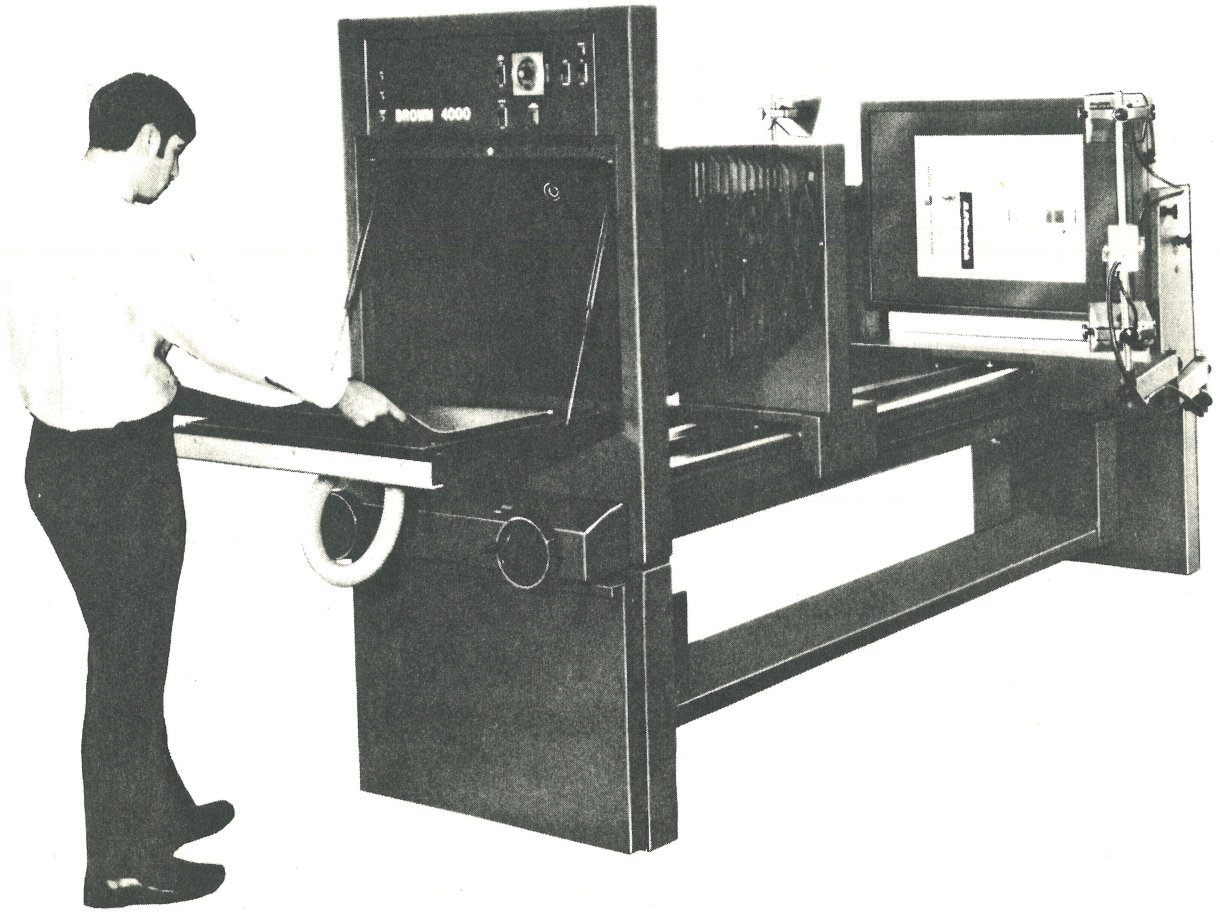
Parts/Form No. 2-16403-000 Process Camera
Printed 6/72

CONGRATULATIONS . . .

. . . on your new time, work, and money-saving investment. Your new Brown Process Camera is the finest ever developed. It incorporates all the imagination, creative engineering, and uncompromising quality that have earned Brown its position of leadership in the industry.

Your Process Camera will provide you with years of outstanding service if you use and maintain it properly.

Before you install your Camera, take a few minutes to read this manual. Then keep it handy for future reference by your cameraman and maintenance people.



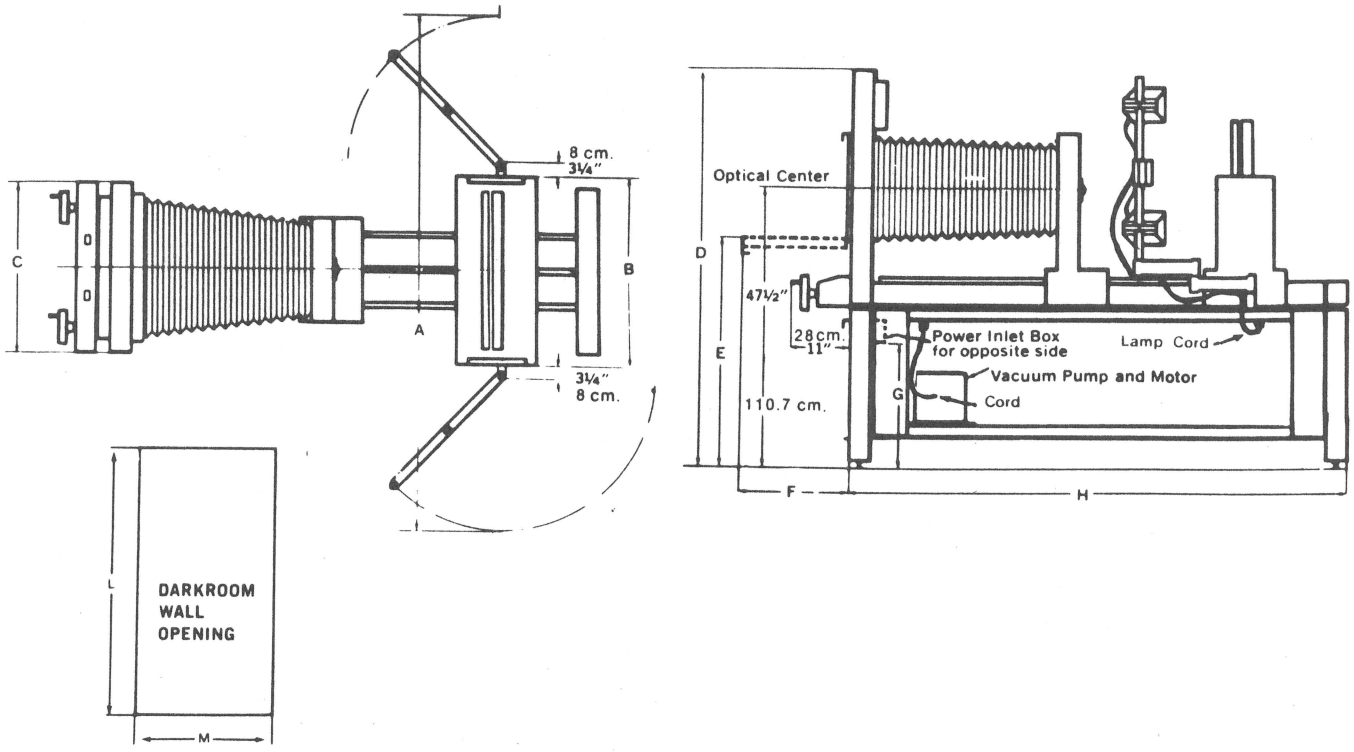
APECO GRAPHIC PRODUCTS GROUP

BROWN 4000 CAMERA 20x24"

TABLE OF CONTENTS

SECTION		PAGE
1	SPECIFICATION DATA	4
2	INSTALLATION	5
	2-1 Inspection	5
	2-2 Unpacking	5
	2-3 Moving the Camera	5
	2-4 Removing the Crate	5
	2-5 Locating Camera	5
	2-6 Leveling	5
	2-7 Electrical Installation	6
	2-8 Power Line Connection	6
	2-9 Installing Lights	6
	2-10 Installing Lamps	6
	2-11 Initial Setting of Copyboard Lights	6
	2-12 Connecting Vacuum System	7
	2-13 Installing Darkroom Wall Cloth	7
	2-14 Removal of Copyboard Carriage	7
3	OPERATION CHECK	7
	3-1 General	7
	3-2 Power Switch	7
	3-3 Vacuum System and Film Holder	7
	3-4 Shutter, Lighting System and Timer	8
	3-5 Remote Exposure Control Outlet (Optional)	8
	3-6 Tape Lights	8
	3-7 Copyboard and Lens Carriage Movement	8
	3-8 Copyboard	8
	3-9 Installing Ground Glass	8
	3-10 Camera Focus and Alignment	8
	3-11 Adjusting Lensboard or Copyboard Scale Tape	9
	3-12 Lens Hood (Optional)	9
4	OPERATION	9
	4-1 Loading the Copyboard	9
	4-2 Copyboard Lights	9
	4-3 Lens Setting	10
	4-4 Size and Focus	10
	4-5 Loading Film	10
	4-6 Exposure	10
	4-7 Removing the Film	10
	4-8 Operational Summary	10
5	TROUBLESHOOTING	11
6	MAINTENANCE	11
	6-1 Lamps and Reflectors	11
	6-2 Copyboard Glass	11
	6-3 Cleaning Lens	11
	6-4 Vacuum Film Holder	11
	6-5 Alignment	11
	6-6 Lubrication	11
	6-7 Safety Warning	12
7	PARTS LISTS	12
	7-1 Replacement Parts	12, 16
8	WIRING DIAGRAM	17

SECTION 1
SPECIFICATION DATA



MODEL	2000		3000		4000	
DIMENSIONS	IN.	CM.	IN.	CM.	IN.	CM.
Standard Copyboard	22x26	56x66	24x36	61x91	24x36	61x91
A Standard Copyboard *	111	212	121	307	121	307
B Standard Copyboard *	34	86	44	112	44	112
Optional Copyboard *	24x36	61xx91	—	—	30x40	76x101
A Optional Copyboard *	121	307	—	—	125½	319
B Optional Copyboard *	44	112	—	—	48½	123
C	30½	77	30½	77	34	86
D	68¼	173	68¼	173	70¼	178
E	38¾	97	38¾	97	39¾	99
F	19½	50	19½	50	21½	55
G	21	53	21	53	18½	46
H	88	224	88	224	122	310
L Wall Opening	74	188	74	188	76	193
M Wall Opening	36	91	36	91	40	102
Electrics Specify 50 or 60 Hz.	230V., 13 amps, ** 3200 watts		230V., 20 amps, 4800 watts		230V., 20 amps, 4800 watts	
Net Weight (lbs.)	782 lbs.	355 Kg.	832 lbs.	377 Kg.	950 lbs.	439 Kg.
Shipping Weight (lbs.)	1,300 lbs.	588 Kg.	1,383 lbs.	513 Kg.	1,675 lbs.	759 Kg.

*Right-hand operation standard; left-hand operation available at no charge.
**With 4000 watt lighting the following applies: 20 amps, 4800 watts.

SECTION 2
INSTALLATION

2-1. INSPECTION. A complete operational inspection was made at the factory before packing the camera in the specially designed shipping container.

Check the camera at once for signs of shipping damage. If damaged, submit a claim immediately to the delivering carrier. Retain all shipping documents for claim purposes.

When uncrating the camera exercise caution to avoid accidentally discarding parts or accessories along with padding and bracing.

2-2. UNPACKING.

2-3. MOVING THE CAMERA. If possible, move the crated camera near its final location. The crate is marked to indicate the end which will be placed near or in the darkroom.

If narrow aisle widths prevent moving the camera while crated, uncrate it but if possible leave it on the shipping skid.

If doorway openings are too narrow for the copyboard to pass through, remove the copyboard as indicated in paragraph 2-14.

Never remove the rear case from the camera track. If necessary the entire track assembly including rear case, front case, and copyboard assembly can be removed from the base stand assembly by removing end panels and hold-down bolts at each end. Move the camera very carefully to avoid damage or misalignment.

2-4. REMOVING THE CRATE. The crate can be disassembled using a nail puller, a pinch bar and a claw hammer. Work carefully to avoid damage to the camera.

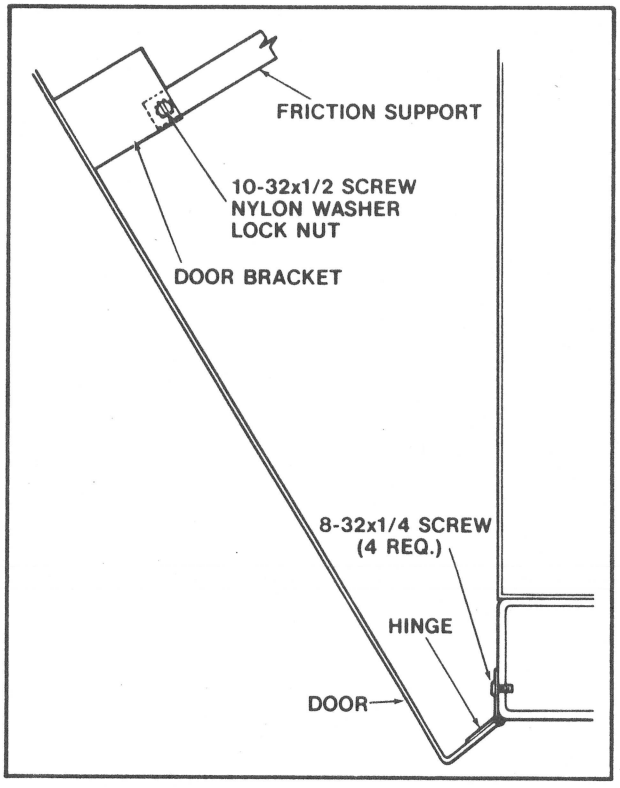
After opening the crate, remove the internal packing material and the accessories which are shipped unassembled.

a. The ground glass assembly is in a carton which is fastened to the back of the copyboard. Remove the straps, wood blocks and padding from the copyboard assembly. Remove the ground glass carton and inspect for damage.

b. Remove the strapping and padding from the rear case. Store the ground glass in the compartment in the lower part of the rear case.

c. Remove the strapping and padding from the camera base. Items shipped attached to the case are the lighting unit assemblies, the vacuum pump unit and a cardboard carton containing the lamps, two vacuum hoses, darkroom cloth and a proportion calculator.

d. On Model 4000 only, mount the ground glass door to the rear case with 4 screws provided. Position nylon washer between door bracket and friction support. Attach door bracket to friction support. See figure below.



Clean the track rails to be sure they are free of all foreign matter and remove all wood wedge blocks before moving the copyboard or lensboard. Lubricate the rails by wiping on a very thin film of light oil, using an oil moistened cloth.

2-5. LOCATING CAMERA. Locate the camera in its final position. If the camera is being installed in the darkroom wall, center the rear case in the wall opening. Check the specifications to be sure there is adequate room for camera movements and working space. See Page 4.

2-6. LEVELING. Four leveling screws are provided, two under the rear case and two under the track support at the copyboard end. Place a level on top of the rear case and adjust the rear case leveling screws. Then place the level along

one of the machined side rails of the camera track and adjust the leveling screws at the copyboard end until the track is level and both screws contact the floor. On very uneven floors, shims may be needed under some leveling screws.

2-7. ELECTRICAL INSTALLATION.

CAUTION

Read all instructions in Sections 2 and 3 and Paragraph 6-7 before applying power.

2-8. POWER LINE CONNECTION.

CAUTION

Observe all applicable electrical codes in making power connections. Connections should be made by an authorized electrician or electrical contractor.

Power supply data is given on the serial number nameplate located on the rear case just below the vacuum back. Power supply must be single phase.

Make power connections in the electrical connection box located on the gallery side of the rear case. Connect power leads to the two wires in the box. Connect a ground lead to brass screw inside the box. Set the circuit breakers by pressing the three reset buttons at the left side of the control panel.

2-9. INSTALLING LIGHTS. Each light assembly is supported by a bracket which is an integral part of the copyboard carriage. To install a light assembly, loosen the setscrew in the bracket. Install the light support arms, inserting the protruding hinge pin into the hole in the carriage bracket. Tighten the setscrew to lock the pin in place.

Check that the upper arm, which has a locking knob at each end, is fully seated into the hole in the lower arm. If necessary, loosen the setscrew in the end of the lower arm, insert the hinge pin fully and tighten the setscrew. See illustration in Section 7 for the proper relationship of the arms.

Loosen the locking knob on the outer end of the upper arm. Insert the end of the light standard into the arm until the collar on the standard bears on the arm. Tighten the knob.

Insert the electrical plug on the end of the light assembly cord into one of the two twist-lock receptacles located under the center of the camera track. Turn the plug to lock it in place.

2-10. INSTALLING LAMPS.

CAUTION

The lamps must be handled with care. To avoid lamp damage, use cotton gloves or a clean soft cloth. Touching a lamp with bare fingers will cause premature lamp failure.

The lamps are held between spring loaded contacts. Insert one end of the lamp into the lamp socket, so the lamp contact aligns with the socket contact. Press the lamp against the socket contact, depressing the contact so the opposite end of the lamp can be aligned with its contact. Release the lamp gently.

2-11. INITIAL SETTING OF COPYBOARD LIGHTS. Adjust the light support arms on each side of the copyboard until they are fully extended at 45 degree angles to the track.

Adjust the reflectors vertically on the standards. Set the bottom of the lower reflectors approximately 2" above the lower edge of the copyboard. Set the top of the upper reflectors approximately 2" below the upper edge of the copyboard.

Set the lensboard and the copyboard at 100%. With your head in front of the camera lens, look for reflections of the lamps in the copyboard. Swing the lights toward or away from the track until they are just outside your view. Both sets of lights should be at the same angle and the same distance from the copyboard.

After completing the OPERATIONAL CHECK, turn on the lamps using the FOCUS switch. Check for proper illumination of each quadrant of the copyboard. Adjust the reflectors as necessary.

If an exposure meter is used to check illumination, it should be used at the focal plane with the ground glass in place. Take readings at each corner and at the center of the ground glass. Adjust the lights to provide uniform readings over the entire area.

When the light setting has been determined, loosen the screws which hold the calibrated discs on the top of the light support arm hinge pins. Set "0" on each disc opposite the arrow on

the arm and tighten the screw. The zero position provides a standard reference. Settings for various types of work can be recorded to simplify light positioning.

2-12. CONNECTING VACUUM SYSTEM. The vacuum pump unit is designed to rest on the lower stringer without bolting. Rubber shock mounts prevent transmission of vibration to the camera.

Locate the pump unit on the stringer close to the rear case. Insert the electrical plug into the twist-lock receptacle under the track immediately in front of the rear case. Turn the plug to lock it in place.

Connect the longer of the two vacuum hoses to the inlet fitting on the pump unit and to the straight fitting on the rear case. Clamp both ends to the hose tightly using the worm drive hose clamps.

Connect the shorter vacuum hose between the right-angle fitting on the darkroom side of the rear case and the fitting in the center of the vacuum film holder. Clamp both ends with the hose clamps.

CAUTION

Excessive clamping pressure can cause the fitting on the film holder to collapse and leak.

2-13. INSTALLING DARKROOM WALL CLOTH. Wall cloth is provided for use as a light seal around the rear case when the camera is installed through the darkroom wall. When installed, the cloth should not be drawn taut but left in loose folds.

Tack the cloth tightly to the wooden strips mounted on the rear case. Then fasten the cloth to the gallery side of the darkroom wall.

2-14. REMOVAL OF COPYBOARD CARRIAGE. The carriage may be removed if the camera must pass through narrow openings.

a. Using masking tape, fasten the Mylar copyboard scale tape securely to the track. Tape it in several places, starting at least a foot from the carriage. Remove the two screws which lock the end of the tape to the slotted bracket on the carriage.

b. The carriage is locked to the track by two bearings, one on each side, which ride on the bottom of the machined side rails. Remove the screws holding the bearings to the carriage and remove the bearings.

c. The copyboard drive screw passes through a drive nut which is secured to the carriage by three bolts which pass through the nut support plate. Remove the three bolts.

d. The carriage assembly can now be lifted carefully straight upward and off of the track.

e. To reinstall the carriage, place it gently into position on the track. Be very careful to lower it so that the two center bearings straddle the center rail. Reattach the drive nut plate by installing the three bolts. Replace the two bearings which ride beneath the track.

NOTE

These bearings are mounted on eccentric studs. Before locking them in place, turn the studs so that the bearings are firmly engaged against the bottom of the track. Fasten the end of the scale tape to the carriage bracket. Pull the tape taut before tightening the screws, then remove the masking tape.

SECTION 3
OPERATIONAL CHECK

3-1. GENERAL. Make this operational check before using the camera. If any malfunction occurs, repeat the check. If the problem continues, consult the troubleshooting section or call your dealer for service.

If the camera malfunctions during its service life, make an operational check to isolate the problem.

3-2. POWER SWITCH. Turn on the power supply to the camera. Press the POWER-ON switch. The red POWER pilot light glows.

3-3. VACUUM SYSTEM AND FILM HOLDER. Grasp the handle at the top of the film holder and pull outward and downward, guiding the film holder to the horizontal position. Center a negative or piece of scrap film on the film holder.

Press the VACUUM-ON switch. The vacuum pump starts and the vacuum pulls the film down flat against the holder. If the film is not held flat, check the vacuum hose connections for leaks. Press the VACUUM-OFF switch.

3-4. SHUTTER, LIGHTING SYSTEM AND TIMER. With the vacuum film holder open, press the focus switch. The copyboard lights go on and the camera shutter opens and remains open.

Turn the lens control handwheel to move the lensboard close to the rear case. Reach through the open shutter and remove the rear lens cap. Press the TIME switch. The copyboard lights go out and the shutter closes.

Set the timer to 20 seconds. Press the START EXPOSURE pushbutton. The pushbutton glows red. The copyboard lights go on and the shutter opens. The red pointer on the timer begins to move toward zero.

In 20 seconds the timer reaches zero. The copyboard lights go out, the shutter closes, and the START EXPOSURE pushbutton light goes out. The timer red pointer resets automatically to the pre-set time.

3-5. TIMED INPUT. When ordered, the camera is equipped with an outlet, on the upper gallery side of the rear case, for connecting a remote exposure control. If such a control is to be used, plug it into the outlet and check its operation according to the manufacturer's instructions.

3-6. TAPE LIGHTS. Press the TAPE LIGHTS-ON switch. Check that LENS and COPY tape scales are illuminated.

3-7. COPYBOARD AND LENSBOARD MOVEMENT. Using the handwheels, move the copyboard and the lensboard through their entire range of travel. If they do not move freely and smoothly, check for foreign matter on the track rails and on the drive screws.

Set both the copyboard and the lensboard to their 100% positions as indicated on the tape scales.

3-8. COPYBOARD. Release the copyboard by pulling the lower lock plunger knob outward. Swing the copyboard carefully to the horizontal loading position. The upper lock plunger latches in place.

Grasp the two copyboard handles and depress the thumb buttons to unlatch the glass frame. Raise the glass frame which is held open by spring counterbalances.

Remove the vinyl copyboard mat. Clean and inspect both copyboard glasses. Replace the vinyl mat.

Grasp the glass frame handles and lower the glass frame, pressing downward firmly until both latches are engaged.

Release the upper lock plunger and tilt the copyboard carefully to the vertical position. The lower lock plunger latches. The copyboard should rest against the two focal plane stop screws.

3-9. INSTALLING GROUND GLASS. Remove the ground glass from the storage compartment in the rear case. Note that the frame includes two locating tabs which project from the bottom edge of the frame.

With the vacuum film holder open, insert the lower edge of the ground glass frame into the focal plane, with the two locating tabs positioned between the pivot blocks. Swing the top of the frame into the focal plane so that the strike pin engages the spring catch in the rear case or as provided on some models, against magnet contact, and the frame is seated against the focal plane stop screws.

3-10. CAMERA FOCUS AND ALIGNMENT. The camera was fully assembled at the factory and thoroughly checked and aligned. However, minor adjustments may be necessary after installation. This checking and alignment can be done by factory supervision of erection (optional at extra cost), by your dealer, or by qualified personnel according to the following instructions.

Carefully rule a fine lined rectangle, 10" long x 8" high, on enamel stock. Referring to the illustration below, rule a horizontal line through the center of the rectangle. This line should extend at least 5" beyond each end of the rectangle. Starting from one of the sides of the rectangle, rule 2" long vertical lines spaced 2" apart along the horizontal line. Mark the corners of the rectangle with the letters A, B, C and D as shown.

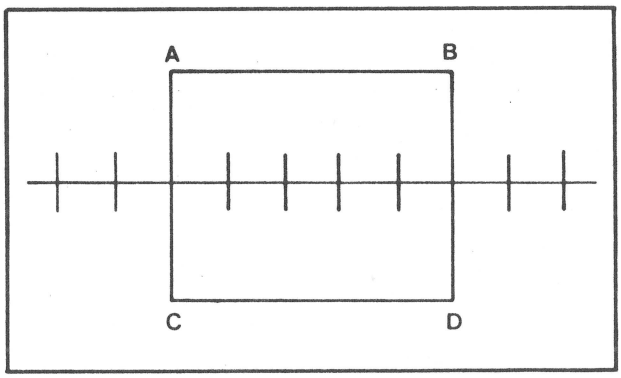


Figure 3-1 Camera Alignment

Place this ruled target in the center of the copyboard. Lay a small piece of screened copy, 120 line if possible, in the center of the rectangle.

Remove the lens caps and set the lens at 100% on the top scale of the diaphragm gauge. Set both the lensboard and the copyboard at 100% using the tape scales.

View the image on the ground glass, using a 10 or 20 power glass focused on the grain of the inside ground glass surface. If the screened image is sharp and all four sides of the rectangle measure correctly, the camera is in square and focus.

If horizontal lines AB and CD are not the same length, the vertical plane of the copyboard must be adjusted. Loosen the strike, on the copyboard frame, into which the lower lock plunger engages.

The bottom of the copyboard frame rests against two Nylon tipped socket head screws. Adjust these screws so that lines AB and CD are of equal length on the ground glass. Be sure both screws are in contact with the copyboard frame. Lock the screws with the locknuts, and tighten the lock plunger strike.

If vertical lines AC and BD are not the same length, the horizontal plane of the copyboard must be adjusted. This is done by adjusting the two bearings which ride against the sides of the center rail. Loosen the set screws which lock the eccentric bearing studs. With a large screwdriver, turn the studs to adjust the bearings until AC and BD are of equal length on the ground glass. Be sure both bearings are in tight contact with the sides of the rail, then tighten the set screws.

Set the lens for f/16 on the top scale of the diaphragm gauge. Set the lensboard and the copyboard at 200%. Focus the image by moving the copyboard and adjust the size of the image by moving the lensboard. When the image is exactly twice the size of the copy and in focus, read the tape scales. Both scales should read 200%. If not, adjust the tapes per Paragraph 3-11.

Move the lensboard to 50% but DO NOT MOVE THE COPYBOARD. Set the lens to f/22 on the top scale. Focus should be good. If not, move the lensboard to the point of best focus. Check the lensboard scale reading. If the reading is not 50%, adjust the tape. After adjustment is made, move the lensboard to 200% with the lens at f/16. Size the image by moving the copyboard. The copyboard scale should read 200%. If not, adjust the copyboard tape.

As a final check, inspect size and focus at settings of 100%, 50% and 25%.

3-11. ADJUSTING LENSBOARD OR COPYBOARD SCALE TAPE. The tape is fastened to a slotted bracket on the lensboard or copyboard carriage. The opposite end of the tape is wound around a spring-loaded drum in the rear case.

To adjust a tape, hold the tape firmly in position and loosen, but do not remove, the two screws in the slotted bracket. Move the tape slightly toward or away from the carriage, until the scale reading is correct, by sliding the metal plate which is attached to the end of the tape. Tighten the two screws and recheck the scale reading. Readjust the tape, if necessary.

3.12. LENS HOOD (OPTIONAL). When ordered, it should be mounted to lens with 3 screws on lens hood. It has a built-in filter slot.

SECTION 4
OPERATION

4-1. LOADING THE COPYBOARD. Release the lower lock plunger and swing the copyboard to the horizontal position until it latches in place. Grasp both copyboard handles, depressing the thumb buttons, and raise the glass frame. Check that the glass and the copy are clean.

For reflection copy, center the copy on the copyboard mat, using the stenciled reference outlines.

For transparent or translucent copy, remove the copyboard mat and center the copy on the translucent glass.

Lower the copyboard glass frame. Always raise and lower the frame carefully to avoid damage. Rough handling will eventually cause misalignment. Press the frame firmly downward until both latches are engaged.

Release the upper lock plunger and swing the copyboard carefully to the vertical position until it locks in place.

4-2. COPYBOARD LIGHTS. Adjust the lights to

the desired position, depending on size and type of copy. Always view the copyboard from in front of the lens to check for unwanted reflections.

For transparent or translucent copy, swing the lights to the rear of the copyboard. Do not place the lights so close to the glass that heat will damage the copy or the copyboard.

4-3. LENS SETTING. Set the lens to the desired "f" stop and percentage. The lensboard is calibrated to provide a direct reading percentage scale for each effective "f" stop. The f/22 scale is commonly used for line copy and the f/16 scale for normal halftone copy. Remember to remove the lens cap.

NOTE

Use f/22 when exposing at full image size.

4-4. SIZE AND FOCUS. For normal work it is not necessary to use the ground glass. Use the handwheels to set the lensboard and copyboard to the desired percentage on the tape scales.

To use the ground glass for special work, lower the vacuum film holder. Insert the ground glass. Use the focus switch to light the copyboard and open the shutter for viewing the image. Be sure to press the TIME switch to close the shutter and remove the ground glass before loading the film.

4-5. LOADING FILM. Lower the vacuum film holder to the horizontal position. Always guide the film holder gently into place to avoid unnecessary wear or damage.

Place a sheet of film on the film holder, emulsion side up, using the red outlines as a guide for centering. If a halftone screen is to be used, place it over the film, emulsion to emulsion.

Press the VACUUM-ON switch. The vacuum pump will draw the film or the film and screen tightly against the vacuum back. Be sure that the film is held flat. Raise the film holder and press it firmly into position against the focal plane stops.

4-6. EXPOSURE. Set the timer for the desired exposure time. The timer has six operating ranges, set by turning the black knurled range knob to any of six click-stopped positions. The range which is indicated to the left on the knob, in normal reading position, is the range in use.

Range Code	Meaning	Full-Scale Range of Timer
s	Seconds. Direct Reading on dial in seconds.	0–6 seconds
x 10 s	Seconds times ten. Ten times dial setting, in seconds.	0–60 seconds
m	Minutes. Direct reading on dial in minutes.	0–6 minutes
x 10 m	Minutes times ten. Ten times dial setting, in minutes.	0–60 minutes
h	Hours. Direct reading on dial in hours.	0–6 hours
x 10 h	Hours times ten. Ten times setting, in hours.	0–60 hours

The black dial pointer is set by turning the clear plastic knob which surrounds and covers the dial.

Press the START EXPOSURE pushbutton to begin exposure.

When exposure is complete the timer will reset and the red indicator light will go out.

4-7. REMOVING THE FILM. Open the film holder and lower it to the horizontal position.

When making halftone negatives, make the flash exposure with the film holder in the horizontal position. This exposure is made using a flashing lamp (not provided) mounted overhead, directly in line with the center of the vacuum film holder.

Press the VACUUM-OFF switch. When the vacuum releases, remove the film for processing.

4-8. OPERATIONAL SUMMARY.

a. Load the copyboard.

b. Set the lens diaphragm for "f" stop and percentage.

c. Focus.

1. By setting lensboard and copyboard to desired percentage.

2. By viewing on the ground glass, using FOCUS switch.

d. Load the film.

e. Make the exposure.

f. Remove the film.

SECTION 5
TROUBLESHOOTING

EFFECT	POSSIBLE CAUSE	REMEDY
Negatives out of Focus	Scales out of adjustment. Movement of lensboard or copyboard carriage after setting.	Adjust scale tapes. See paragraph 3-11.
Negatives not sharp at edges.	Insufficient vacuum.	Check vacuum hose connections.
	Lens diaphragm open too far.	Stop down to smaller opening.
Fogged negatives	Light leaks.	Check bellow for leaks and repair.
		Check lensboard and light trap of vacuum film holder.
Lack of portion of image	Dirty lens.	Clean lens with lens tissue
Vertical or horizontal lines in copy not reproduced parallel	Copyboard out of vertical or horizontal alignment.	Align copyboard as noted in instructions. See paragraph 3-10.
Lamp failure	One lamp on same bank defective. (Second lamp will also not ignite.)	Recommend replacing both lamps to insure uniform lighting and equal lamp life.

SECTION 6
MAINTENANCE

6-1. LAMPS AND REFLECTORS. Regularly inspect the lamps and reflectors for accumulation of dust or dulling film. With power OFF, remove the lamps and clean both lamps and reflectors with cotton and clean water. Dry *thoroughly*. To avoid scratching lamps or reflector, do not use cloths or cleaning compounds.

6-2. COPYBOARD GLASS. Inspect and clean the copyboard glass daily. Do not use cleaners which contain wax or alcohol.

6-3. CLEANING LENS. Inspect the lens daily for dust, dirt or finger prints. Clean the lens with lens tissue, rubbing gently.

6-4. VACUUM FILM HOLDER. Clean the vacuum back daily to remove surface dirt. At least each month, check vacuum hose connections for possible leaks.

6-5. ALIGNMENT. At least twice a year, check camera alignment and focus.

6-6. LUBRICATION. Each month, apply general purpose lubricating oil to all bearing friction surfaces such as copyboard plunger and pivots, handwheel shafts, and all counterbalance rods. Clean the track rails and drive screws and wipe on a thin film of oil.

6-7. SAFETY WARNING.

WARNING

The electrical system of this camera is supplied with high amperage. Housings should not be opened unless power is turned off at the supply line disconnect. Avoid contact with all internal wiring. Electrical service should be done only by the dealer's serviceman or by a qualified electrical technician.

SECTION 7
PARTS LISTS

7-1. REPLACEMENT PARTS. Parts which may require replacement during the life of the camera are identified in the parts lists and illustrations which follow.

We are best able to fulfill your replacement parts requirement through your authorized Brown Process Camera Dealer with whom we have established open account accommodations. Should you elect to contact our Factory Parts Department directly we will, of course, fill your order. However, inasmuch as we do not maintain individual user accounts, such parts will be shipped to you on a C.O.D. basis.

IT IS ESSENTIAL THAT THE FOLLOWING INFORMATION BE SUPPLIED.

Name, address and telephone number of firm.

Name and title of person placing order.

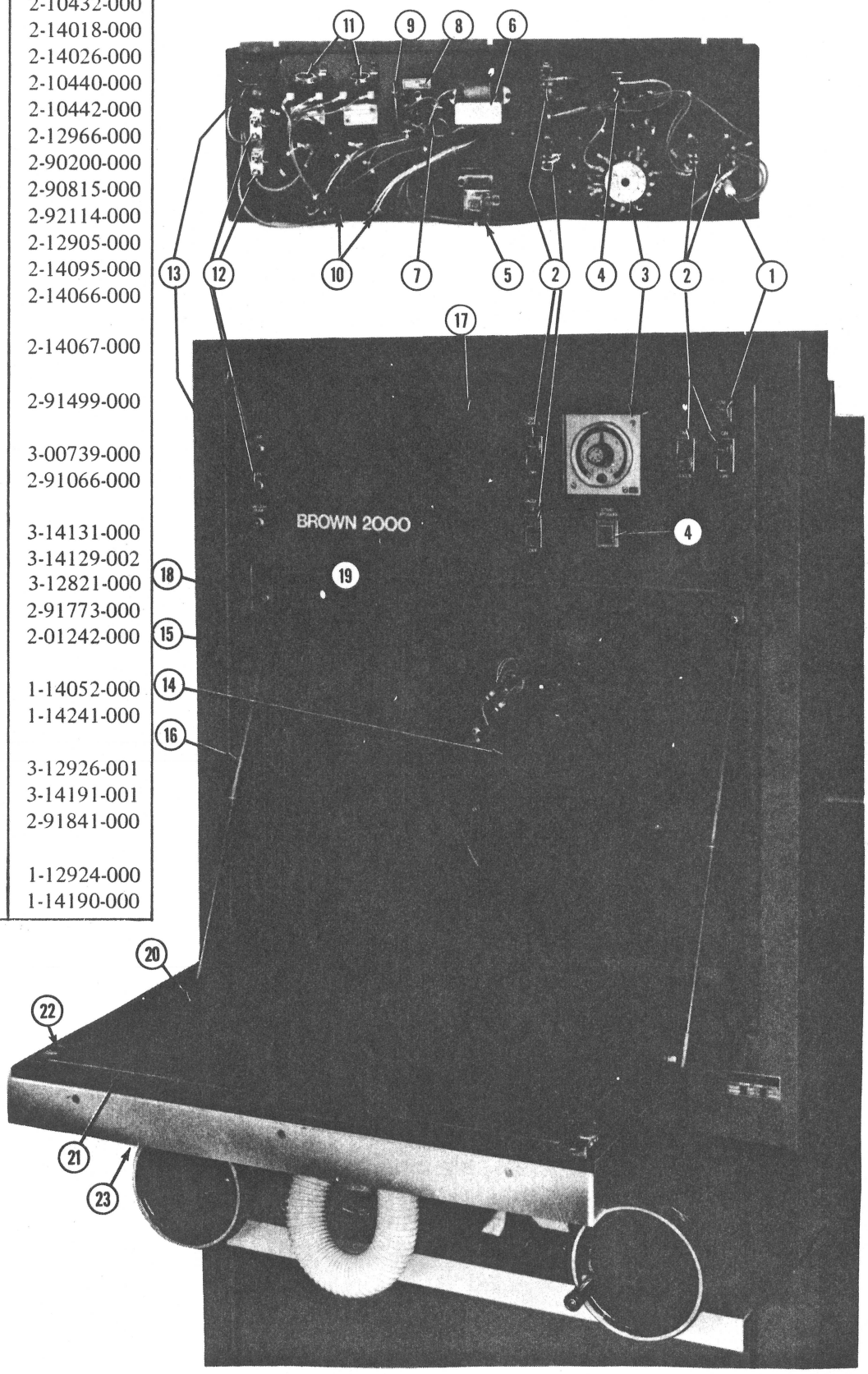
Model and serial number of machine (refer to serial number nameplate).

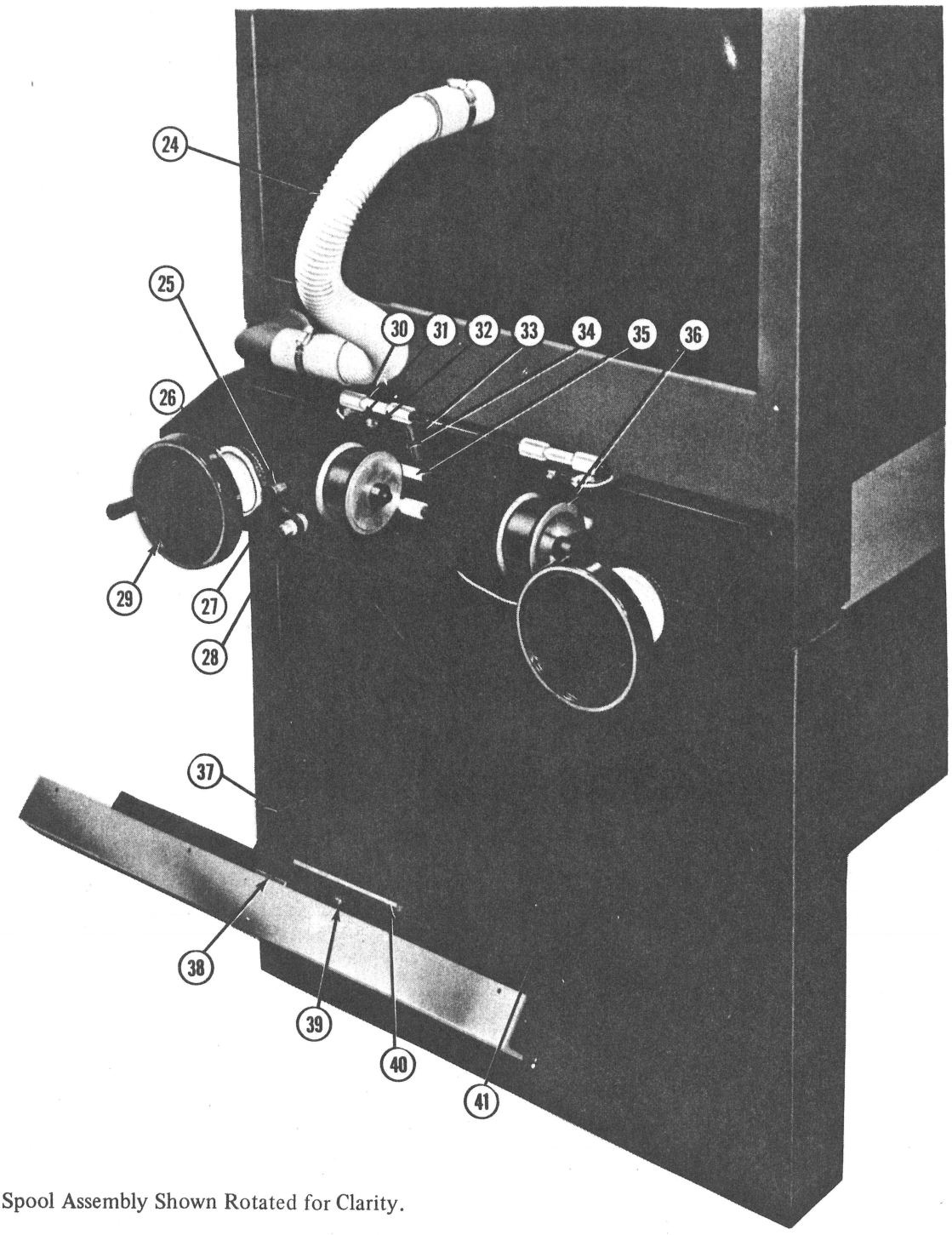
Date of installation of machine (if known).

Brown 4000
Model # 1000
ser # 4012

ITEM	DESCRIPTION	PART NO.
1.	Pilot Light	2-10456-000
2.	D.P.D.T. Switches	2-10432-000
3.	Timer*	2-14018-000
4.	Start Expose Switch	2-14026-000
5.	Relay	2-10440-000
	(Relay Socket)	2-10442-000
6.	Transformer	2-12966-000
7.	Capacitor	2-90200-000
8.	Shutter Rectifier	2-90815-000
9.	Resistor	2-92114-000
10.	Terminal Block	2-12905-000
11.	Power Relays	2-14095-000
12.	Circuit Breaker Line – 15 Amp	2-14066-000
	Circuit Breaker Line – 20 Amp	2-14067-000
13.	Circuit Breaker Vacuum Pump – 3.5 Amp	2-91499-000
14.	Shutter Assembly Complete	3-00739-000
15.	Shutter Solenoid	2-91066-000
16.	Counter Balance Arm Assy	
	(Models 2000 and 3000)	3-14131-000
	(Model 4000 Only)	3-14129-002
17.	Control Panel Weldment	3-12821-000
18.	Strike	2-91773-000
19.	Focal Plane Stop Screw	2-01242-000
20.	Perforated Sheet**	
	(Models 2000 and 3000)	1-14052-000
	(Model 4000 Only)	1-14241-000
21.	Vacuum Back Assembly**	
	(Models 2000 and 3000)	3-12926-001
	(Model 4000 Only)	3-14191-001
22.	Catch	2-91841-000
23.	Handle	
	(Models 2000 and 3000)	1-12924-000
	(Model 4000 Only)	1-14190-000

*Specify 50 or 60 cycles.
**Specify if DIN or Metric.





Tape Spool Assembly Shown Rotated for Clarity.

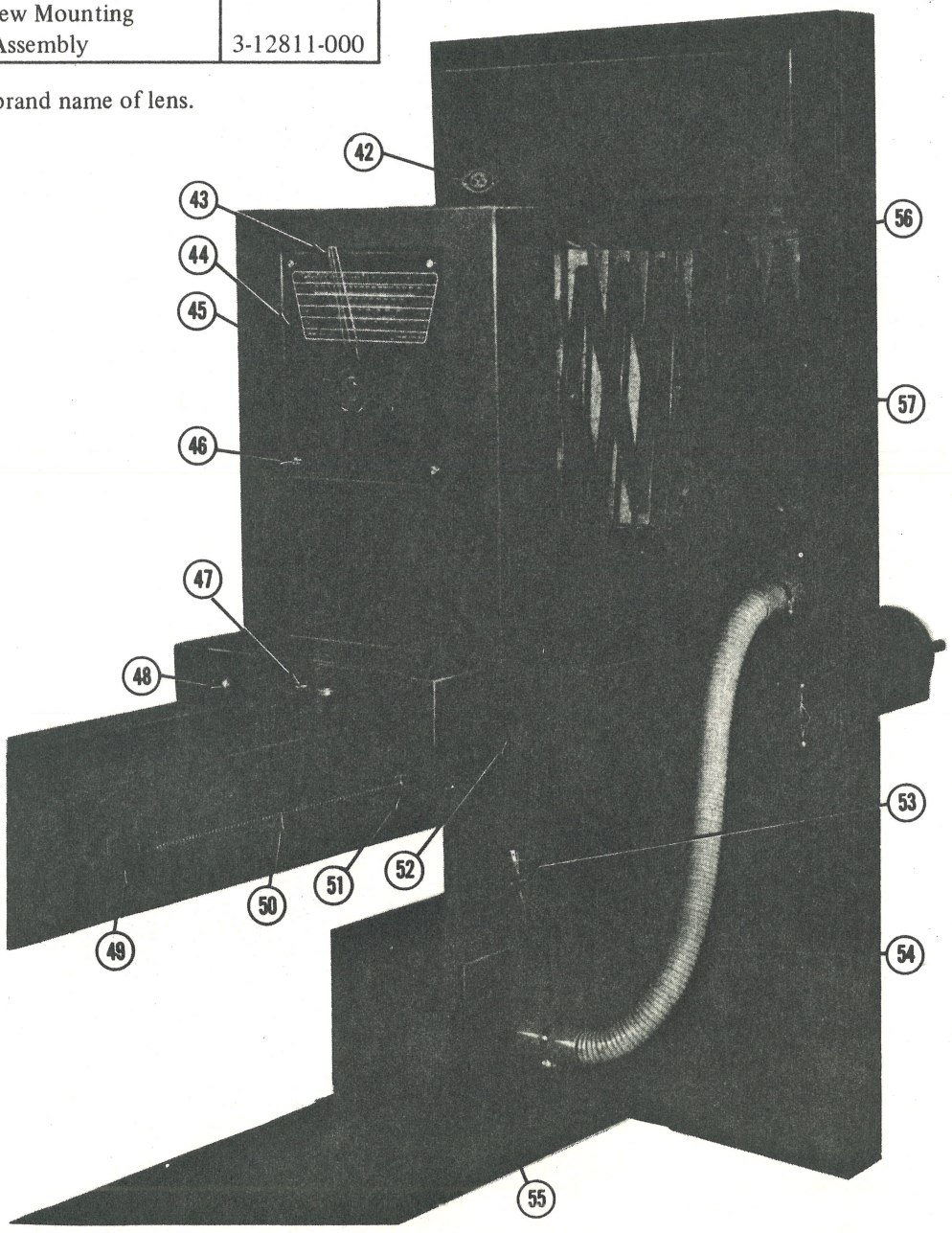
ITEM	DESCRIPTION	PART NO.
24.	Vacuum Hose	2-14061-002
25.	Idler Bronze Bearing	2-14028-000
26.	Pulley	2-14024-000
27.	Timing Belt	2-14029-000
28.	Pulley	2-14032-000
29.	Handwheel	3-00178-002
30.	Flanged Take Up Bearing	2-14035-000
31.	Lamp Holder	2-14025-000
32.	Lamps	2-90771-000
33.	Clear Pointer	1-12959-000
34.	Filter D.R. Tape	1-12960-000

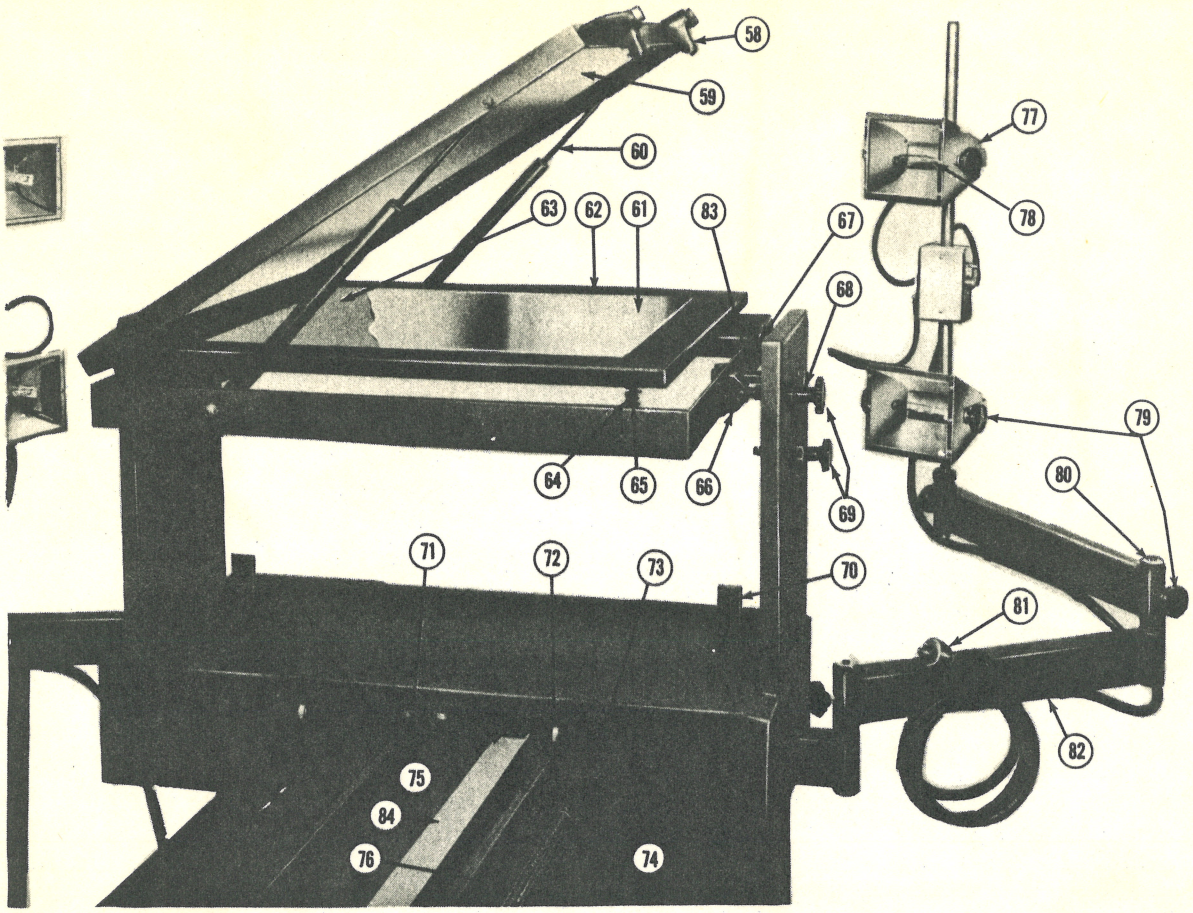
ITEM	DESCRIPTION	PART NO.
35.	Take Up Bearing	1-14063-000
36.	Drum Pulley	1-01487-000
	• Drum Spring	1-01485-000
37.	Friction Support	2-14070-000
38.	Catch	2-91841-000
	• Mating Strike	2-91773-000
39.	Lock Assembly	3-01757-001
40.	Handle	1-08489-000
41.	Ground Glass	
	(Models 2000 and 3000)	1-12909-000
	(Model 4000 Only)	1-14212-000

ITEM	DESCRIPTION	PART NO.
42.	Optional – Integrated Timed Input Kit	
	• Male Receptacle Shown	2-92083-000
	• Female Plug Not Shown	2-92082-000
	• Relay Not Shown	2-90571-000
	• Plug Not Shown	2-91718-000
	• Cord Not Shown	2-10472-000
43.	Diaphragm Pointer	2-01056-000
44.	Lensboard – Model 2000	1-12882-000
	Lensboard – Model 3000	1-16016-000
	Lensboard – Model 4000	1-14195-000
45.	Iris Ring – Model 2000	SEE NOTE
	Iris Ring – Model 3000	SEE NOTE
	Iris Ring – Model 4000	SEE NOTE
46.	Knurled Thumb Screw	2-90342-000
47.	Eccentric Bearing Assembly	3-14407-000
48.	Standard Bearing Assembly	3-00712-001
49.	Drive Screw Mounting Bracket Assembly	3-12811-000

NOTE: Specify brand name of lens.

ITEM	DESCRITION	PART NO.
50.	Lens Carriage Drive Screw	
	(Models 2000 and 3000)	2-14020-000
	(Model 4000 Only)	2-14238-000
51.	Ball Nut Assembly	2-90622-000
52.	Lower Eccentric Bearing Assembly	3-00712-002
53.	Male Plug	2-14011-000
	• Mating Female Receptacle	2-14004-000
54.	Pump Vacuum Hose	2-14061-001
55.	Vacuum Pump Assembly	3-14162-000
	• Vacuum Pump Only	2-12908-000
56.	Bellows	
	(Models 2000 and 3000)	2-12872-000
	(Model 4000 Only)	3-14247-000
57.	Bellows Support Assembly – Model 4000 Only	3-14246-000





ITEM	DESCRIPTION	PART NO.
58.	Copyboard Handle Assembly (Right)	3-00167-001
	Copyboard Handle Assembly (Left)	3-00167-002
	• Catch Only	1-01034-000
59.	Cover Glass 22 x 26 Copyboard	2-12801-000
	Cover Glass 24 x 36 Copyboard	2-14071-000
	Cover Glass 30 x 40 Copyboard	2-14266-000
60.	Glass Frame Counterbalance Assembly 22 x 26 Copyboard	3-14021-000
	Glass Frame Counterbalance Assembly 24 x 36 and 30 x 40 Copyboard	3-14075-001
61.	Transparency Glass 22 x 26 Copyboard	2-12800-000
	Transparency Glass 24 x 36 Copyboard	2-14074-000
	Transparency Glass 30 x 40 Copyboard	2-14265-000
62.	Wood Insert 22 x 26 Copyboard	1-12795-000
	Wood Insert 24 x 36 Copyboard	1-14122-000
	Wood Insert 30 x 40 Copyboard	1-14264-000
63.	Vinyl Insert 22 x 26 Copyboard	1-02443-005
	Vinyl Insert 24 x 36 Copyboard	1-02443-002
	Vinyl Insert 30 x 40 Copyboard	1-02443-009
64.	Insert Spring	2-12991-000

ITEM	DESCRIPTION	PART NO.
65.	Stud – Copyboard	1-12794-000
66.	Plunger Strike	2-12984-000
67.	Copyboard Latch Strike	1-01025-000
68.	Lock Plunger Assembly	3-00724-001
	• Insert Spring Only	2-02959-004
69.	Plunger Knob	2-90462-000
70.	Focal Plane Stop Screw	1-01242-000
71.	Eccentric Bearing Assembly	3-14407-000
72.	Standard Bearing Assembly	3-00712-001
73.	Lower Eccentric Bearing Assembly	3-00712-002
74.	Ball Nut Assembly	2-90622-000
75.	Tape Bracket Assembly	3-12898-000
76.	Copy Carriage Drive Screw	
	(Models 2000 and 3000)	2-14019-000
	(Model 4000 Only)	2-14238-000
77.	Lamp Reflector Assembly	3-01101-001
78.	Lamp, 600 Watt Type FCB	2-14009-000
	Lamp, 1000 Watt Type DXN	2-91702-000
79.	Lock Knob	2-90043-000
80.	Angle Indicator	2-03160-001
81.	Male Lamp Plug	2-14010-000
	• Mating Female Receptacle	2-14003-000
82.	Lamp Arm	3-00705-000
83.	Copyboard Pivot Pin	1-12874-000
84.	Tape Scales	SEE NOTE

NOTE: When ordering replacement tape scales specify Serial Number of camera and size and Serial Number of lens. Part Number of individual "Copy" and "Lens" tape can be found on each tape.